C L A I M S

1. A vacuum pick and place device characterized by comprising:

a pick and place nozzle which includes a vacuum cup having an air suction port and sucks in air from the air suction port to lift a part to said lifting portion;

a vacuum supply unit which supplies a vacuum for suction to said pick and place nozzle; and

a pick and place confirming sensor which outputs an electrical signal indicating presence or absence of a part lifted to said lifting portion on the basis of a change in flow rate of air sucked in from the air suction port.

2. A vacuum pick and place device according to claim 1, characterized in that said pick and place confirming sensor includes

a base arranged in a gas channel,

a heater formed as a thin film on a surface of said base,

a plurality of temperature sensors formed as thin films on said surface of said base, and

detection means for measuring a gas flow rate on the basis of a temperature distribution in the vicinity of said heater which is measured by said temperature sensors.

3. A vacuum pick and place device according to claim 1, characterized by further comprising:

a valve which controls suction of air from said pick and place nozzle using the vacuum, and

an air suction passage which connects said pick and place nozzle, pick and place confirming sensor, valve, and vacuum supply unit to each other.

4. A vacuum pick and place device according to claim 3, characterized in that said pick and place confirming sensor includes

a flow sensor which detects a change in flow rate of air measured in said air suction passage between said valve and pick and place nozzle, and

detection means for outputting an electrical signal indicating the presence or absence of a part lifted to said lifting portion on the basis of an output from said flow sensor.

5. A vacuum pick and place device according to claim 4, characterized in that said flow sensor detects a change in flow rate of air measured in a portion of said air suction passage which is in the vicinity of said pick and place nozzle.

6. A vacuum pick and place device according to claim 1, characterized in that

said pick and place nozzle includes a plurality of pick and place nozzles which suck in air

through the air suction ports by sharing the vacuum, so as to lift different parts, and

said pick and place confirming sensor is provided for each of said pick and place nozzles.

7. A vacuum pick and place device according to claim 1, characterized in that said pick and place nozzle includes an air suction port which is provided to one open end and through which air is sucked in.

8. A vacuum pick and place device according to claim 7, characterized in that said pick and place nozzle further includes an air suction hole in which a flow speed of air sucked in through the air suction port by the vacuum becomes a sonic speed.

9. A vacuum pick and place device according to claim 7, characterized in that said pick and place nozzle further includes an air suction hole which has a channel sectional area with such a size that a flow speed of air sucked in through the air suction port by the vacuum becomes a sonic speed and in which an opening area of the air suction port changes in accordance with a state of a part lifted to said lifting portion.

10. A vacuum pick and place device according to claim 1, characterized in that

said pick and place nozzle further includes an air suction hole which opens to the air suction port and

guides air, sucked in through the air suction port, to a nozzle inner chamber of said pick and place nozzle connected to and in contact with said vacuum supply unit, and

said vacuum supply unit generates a vacuum with which a pressure at an upstream end of the air suction hole is substantially not less than twice a pressure at a downstream end.

11. A pick and place confirming sensor characterized by comprising:

a flow sensor which, when a part is to be lifted to an air suction port of a pick and place nozzle, detects a change in flow rate of air sucked in through the air suction port; and

detection means for outputting an electrical signal indicating presence or absence of a part lifted to said lifting portion on the basis of an output from said flow sensor.

12. A pick and place confirming sensor according to claim 11, characterized in that

said flow sensor includes

a base arranged in a gas channel,

a heater formed as a thin film on a surface of said base, and

a temperature sensor formed as a thin film on

said surface of said base, and

said detection means measures a gas flow rate on the basis of a temperature distribution in the vicinity of said heater which is measured by said temperature sensor.

13. A pick and place confirming sensor according to claim 11, characterized in that said detection means outputs an electrical signal indicating presence or absence of a part lifted to the vacuum cup of said pick and place nozzle on the basis of a change in flow rate of air measured in an air suction passage between said pick and place nozzle and a valve which controls suction of air from the pick and place nozzle of a vacuum pick and place device.

14. A pick and place confirming sensor according to claim 13, characterized in that said detection means outputs an electrical signal indicating presence or absence of a part lifted to said lifting portion on the basis of a change in flow rate of air measured in a portion of said air suction passage which is in the vicinity of said pick and place nozzle.

15. A pick and place confirming sensor according to claim 11, characterized in that said detection means outputs an electrical signal indicating presence or

absence of a part lifted to the air suction port on the basis of a change in flow rate of air sucked in through an air suction hole which includes an air suction port of a pick and place nozzle of a vacuum pick and place device as one open end, and

in which a flow speed of air sucked in through the air suction port becomes a sonic speed.

16. A pick and place confirming sensor according to claim 11, characterized in that said detection means outputs an electrical signal indicating presence or absence of a part lifted to the air suction port on the basis of a change in flow rate of air sucked in through an air suction hole which includes an air suction port of an pick and place nozzle of a vacuum pick and place device as one open end and

has a channel sectional area with such a size that a flow speed of air sucked in through the air suction port becomes a sonic speed, and in which an opening area of the air suction port changes in accordance with a state of a part lifted to said lifting portion of said pick and place nozzle.

17. A pick and place confirming sensor according to claim 13, characterized by further comprising a connector to be connected to said air suction passage.

18. A pick and place confirming sensor according

to claim 11, characterized by further comprising a board which mounts and holds said flow sensor thereon and which forms a wall of a channel.

19. A pick and place confirming sensor according to claim 12, characterized in that said temperature sensor includes

an upstream temperature sensor arranged on an upstream side of a gas flowing direction,

a downstream temperature sensor arranged on a downstream side, and

an ambient temperature sensor arranged near the upstream side of said base.

20. A pick and place confirming sensor according to claim 12, characterized in that

said base has a cavity at a central portion thereof, and

a diaphragm which thermally insulates said temperature sensor and base from each other is further provided on the cavity.